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Indian Standard

DETERMINATION OF COLOUR STABILITY OF DENTAL POLYMERIC MATERIALS

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MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
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DETERMINATION OF COLOUR STABILITY OF DENTAL POLYMERIC MATERIALS

Dental Materials Sectional Committee, CDC 52

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Indian Standard

DETERMINATION OF COLOUR STABILITY OF DENTAL POLYMERIC MATERIALS

0. FOREWORD

0.1 This Indian Standard was adopted by the Bureau of Indian Standards on 31 August, 1987 after the draft finalized by the Dental Materials Sectional Committee had been approved by the Chemical Division Council.

0.2 Colour stability is an important characteristic of dental polymeric materials and it is expected that the test methods in this standard will be referred to in the standard specifying those materials.

0.3 In the preparation of this standard, assistance has been derived from ISO 7491-1985 Dental materials — Determination of colour stability of dental polymeric materials.

0.4 In reporting the result of a test or analysis made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS : 2-1960*.

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1. SCOPE

1.1 This standard specifes a method for the determination of colour stability of dental polymeric materials.

2. METHOD OF TEST

2.1 Apparatus

2.1.1 *Radiation Source* — Xeron lamp with a colour temperature of 5 000 to 7 000°K and with an illumirance at the specimen of 150 000 lux. Any deviation of the illuminance from the mean value at any given moment shall not exceed ± 10 percent over the entire area occupied by the test specimen.

2.1.1.1 Other radiation sources of equivalent performance to the xenon are also suitable.

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*Rules for rounding off numerical values (*revised*).

NOTE — The xenon lamp and the filters (2.1.2) should normally be replaced after 1 500 h use because of the change of radiation intensity due to ageing. The illuminance output should be calibrated with a suitable light measuring instrument such as the Hanau instrument.

2.1.2 *Filters*

2.1.2.1 *Ultraviolet filters* — Borosilicate glass filter with transmittance of less than 1 percent below 300 nm and greater than 90 percent above 370 nm.

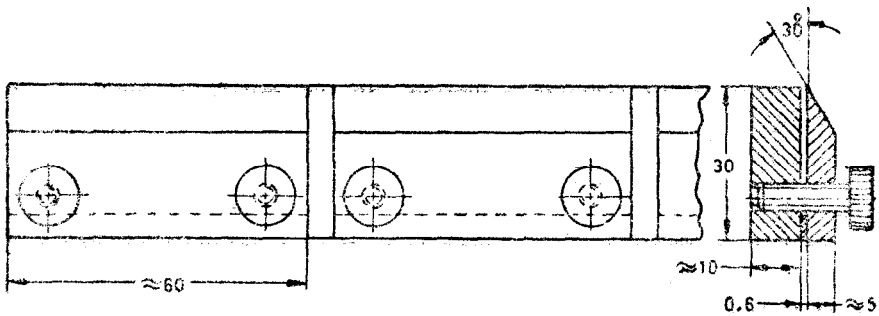
2.1.2.2 *Heat Filter* — Such that the temperature recorded with the filter in position will not exceed 55°C when measured by a black panel thermometer (*see* note), or a mercury thermometer with a blackened bulb, mounted in the position normally occupied by the test specimen.

NOTE — The black panel thermometer consists of a 0·9 ± 0·1 mm thick steel panel, the size of one specimen and finished with a black glossy enamel having good resistance to light. A means for measuring the temperature of the panel is provided at the centre; a thermocouple or bimetallic thermometer making intimate contact with the panel is suitable.

2.1.3 *Test Chamber* — The test chamber comprises the following components.

2.1.3.1 *Trough of circulating water* — maintained at 37 ± 5°C. The water level is maintained at 10 ± 5 mm above the specimens and the specimens are held parallel to the bottom of the chamber.

2.1.3.2 *Specimen holder* — A suitable holder for discs up to 50 mm diameter is shown in Fig. 1.



All dimensions in millimetres.

FIG. 1 HOLDER FOR SPECIMEN DISCS UP TO 50 mm DIAMETER

2.2 Procedure

2.2.1 *Radiation Test* — Either clamp the specimen discs with half of each one in the holder as shown in the figure or cover one half of each

specimen with tin or aluminium foil. For specimen teeth, cover half of the vestibular surface with tin or aluminium foil parallel to the long axis of the tooth.

2.2.1.1 With the filters (**2.1.2**) in position, expose the test specimens in the water bath to the radiation of the xenon lamp (**2.1.1**) for 24 h. Take care to avoid casting shadows on the specimens.

2.2.2 *Colour Comparison* — Store unradiated specimen under deionized water for 24 h before comparing with the exposed specimens.

2.2.2.1 Use three people with normal colour vision to compare by visual inspection the exposed and unexposed half of each of the specimens and the unradiated specimen for any colour differences. Make the comparison in bright diffuse daylight under an overcast "northern/ southern" sky or alternatively, under the xenon or equivalent lamp without any significant coloured reflection using a minimum illuminance of 1 000 lux.

2.2.2.2 For specimen discs, place a diffused white background of reflectance 90 percent (white bond paper is suitable) behind the sample. Limit the background to the size of the disc and surround it by a diffused black background felt or velvet is suitable.

2.2.2.3 For tooth shaped specimens, use a diffused black background such as felt or velvet.

2.2.2.4 Allow the three observers to view the specimens for a period of not longer than 2 seconds.

2.2.2.5 Record the mean of the independent comparisons of the three observers.

INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

Quantity	Unit	Symbol
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

Quantity	Unit	Symbol
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

Quantity	Unit	Symbol	Definition
Force	newton	N	1 N = 1 kg.m/s²
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V.s
Flux density	tesla	T	1 T = 1 Wb/m²
Frequency	hertz	Hz	1 Hz = 1 c/s (s^{-1})
Electric conductance	siemens	S	1 S = 1 A/V
Electromotive force	volt	V	1 V = 1 W/A
Pressure, stress	pascal	Pa	1 Pa = 1 N/m²